

# (12) UK Patent Application (19) GB (11) 2 274 593 (13) A

(43) Date of A Publication 03.08.1994

(21) Application No 9401165.7

(22) Date of Filing 21.01.1994

(30) Priority Data

(31) 05006129

(32) 28.01.1993

(33) JP

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(51) INT CL<sup>5</sup>

A61N 1/40

(52) UK CL (Edition M )

A5R RHFE

(56) Documents Cited

GB 2164563 A

US 4292980 A

(58) Field of Search

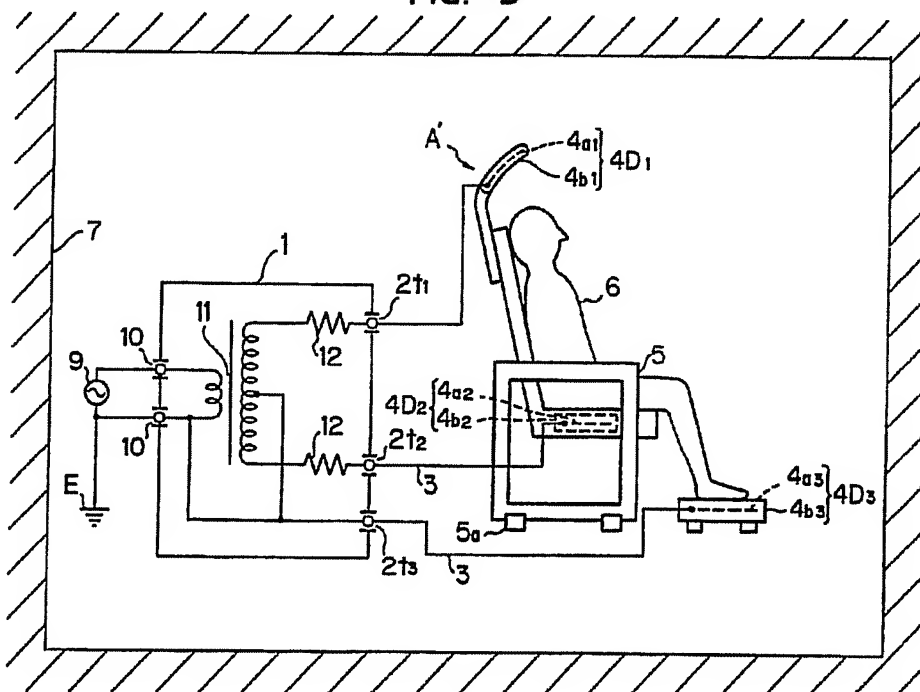
UK CL (Edition M ) A5R RHFE

INT CL<sup>5</sup> A61N 1/40

## (54) Electric field therapy apparatus

(57) An electric field therapy apparatus has three output terminals  $2t_1$ ,  $2t_2$ ,  $2t_3$  provided on a secondary coil of a step-up transformer 11, electrically-conductive elements  $4D_1$ ,  $4D_2$ ,  $4D_3$ , connected to the output terminals and arranged such that one of the electrically conductive elements is located in the vicinity of the head portion of a human being 6, another one located at the foot portion, and the remaining one located at an intermediate portion between the first and second electrically-conductive elements. By means of this arrangement, an electric potential for creating a difference in electric potential among the electrically-conductive elements is supplied. The element  $4D_3$  at the patient's feet is connected to earth.

FIG. 3



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FIG. 1

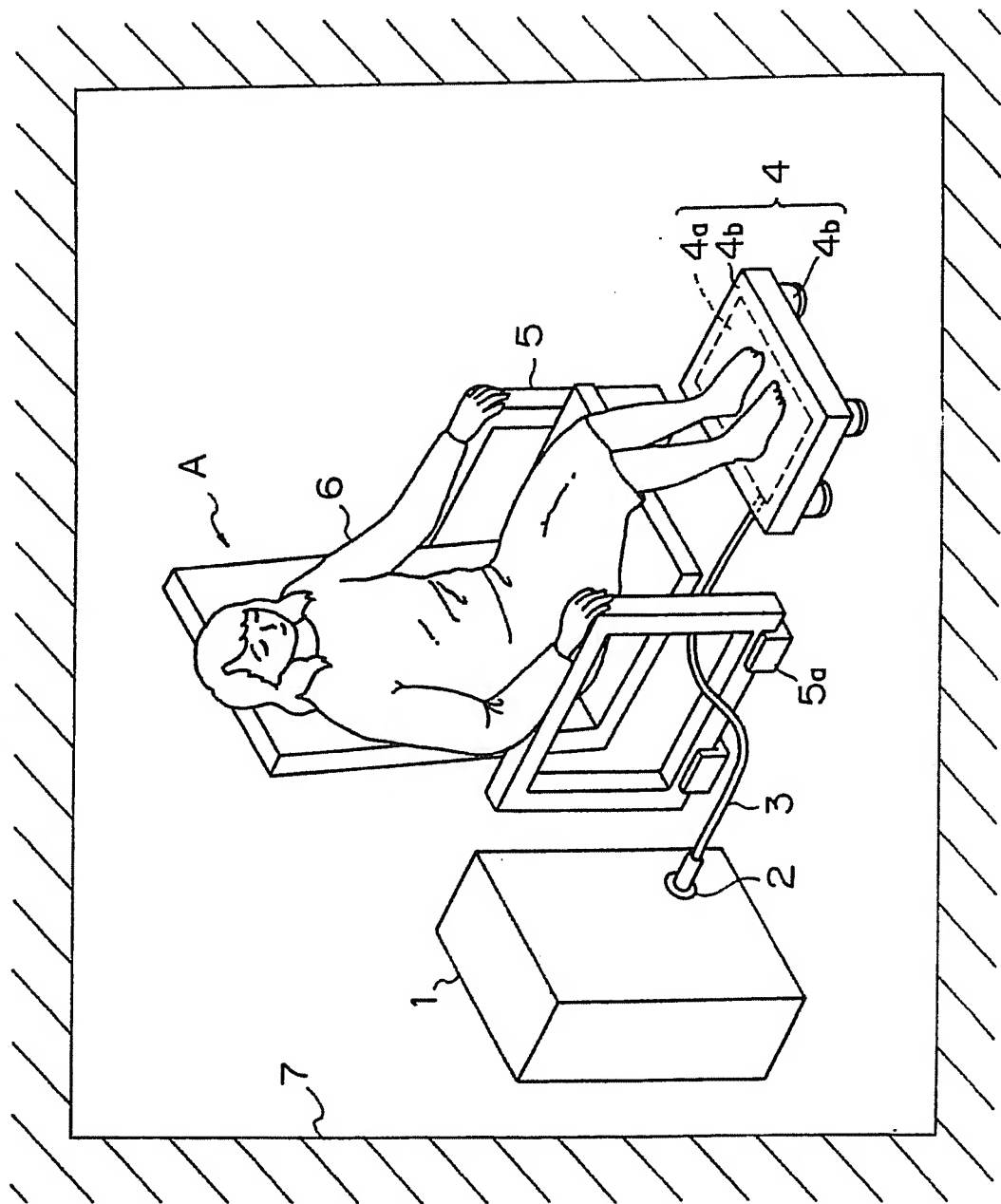


FIG. 2

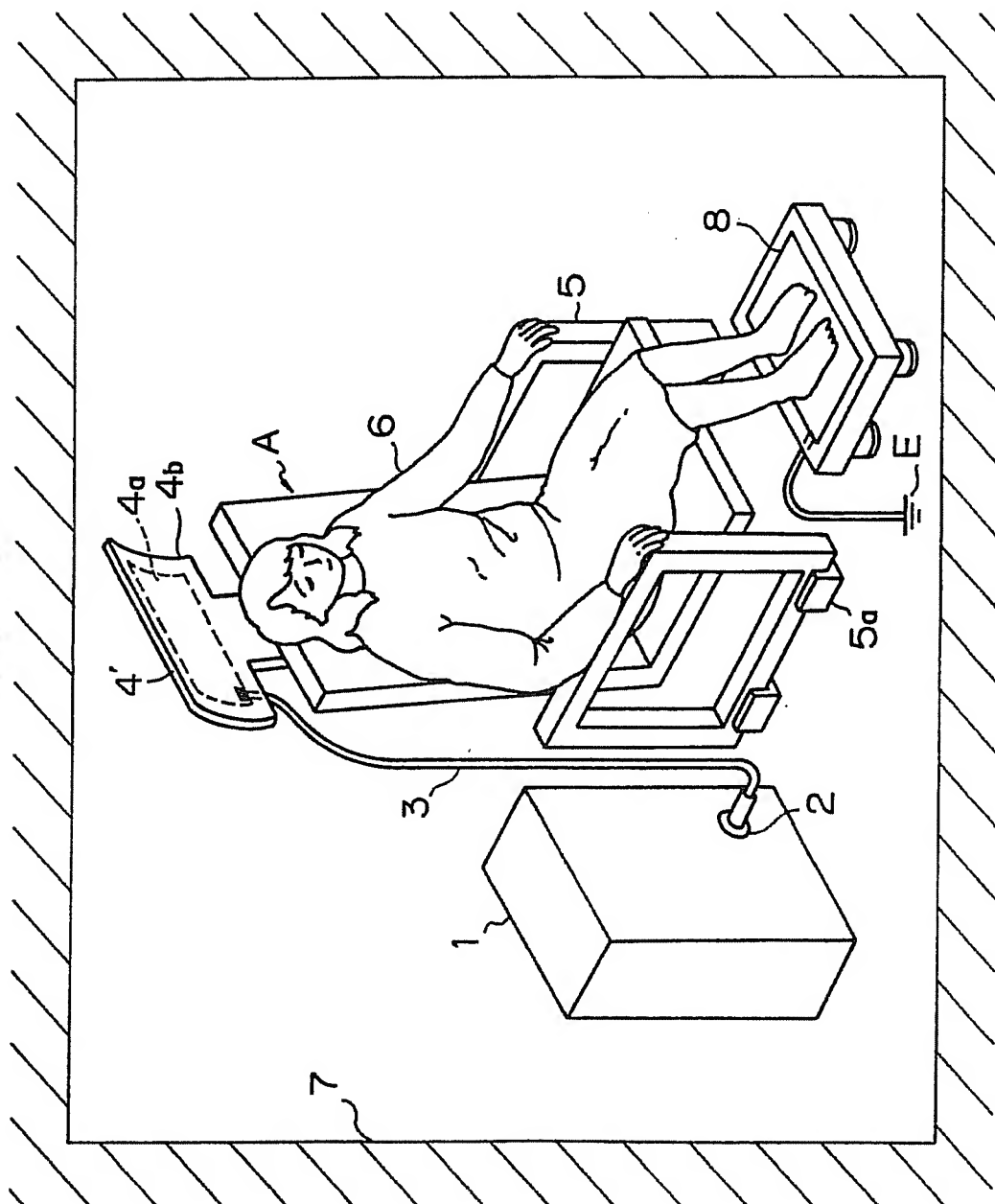
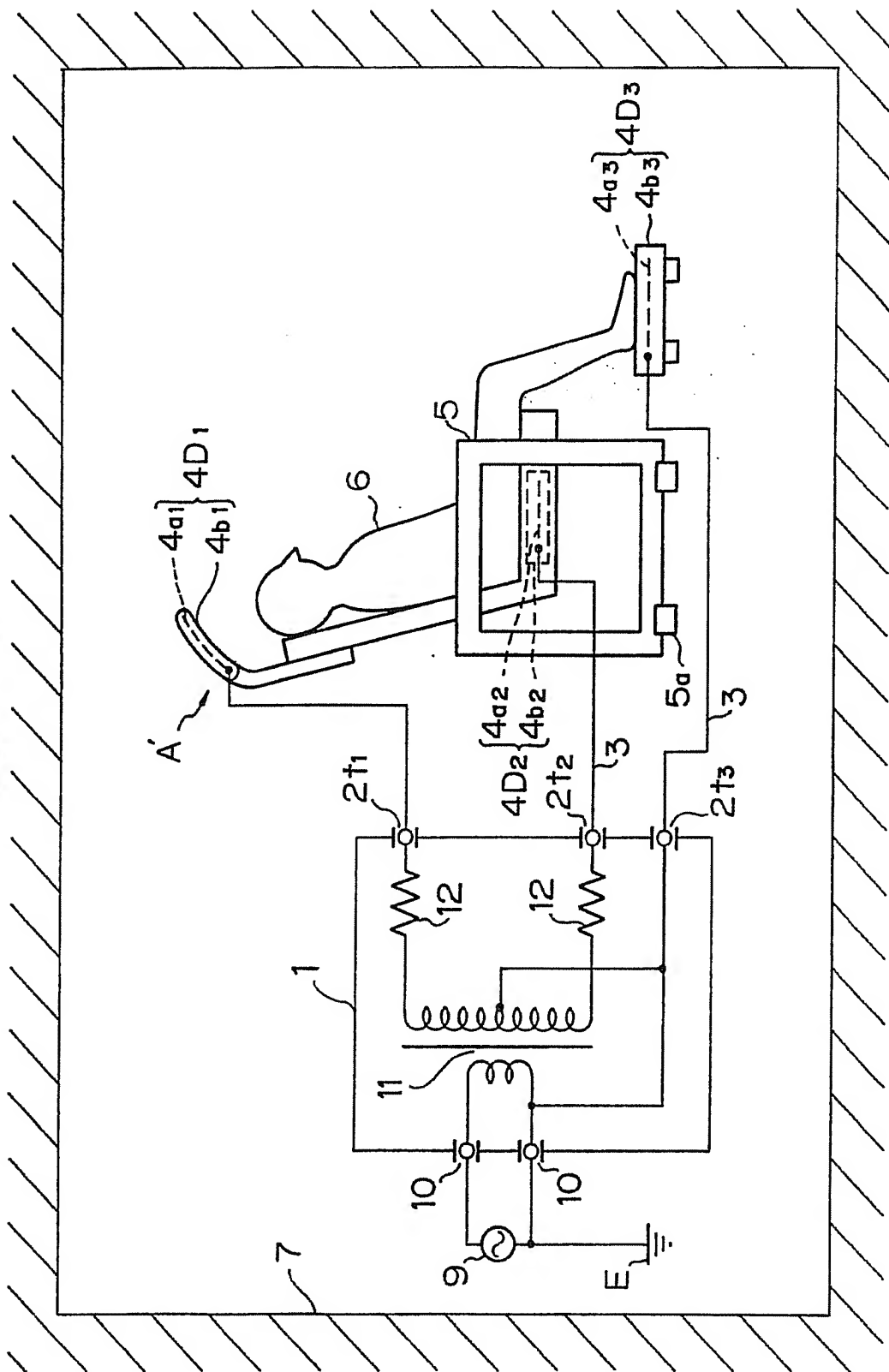


FIG. 3



## SPECIFICATION

## TITLE OF THE INVENTION

## ELECTRIC FIELD THERAPY APPARATUS

This invention relates to electric field therapy apparatus.

Fig. 1 is an illustration showing a normal state of use of a conventional electric field therapy apparatus (A). In Fig. 1, reference numeral (1) denotes a main body (1) of the electric field therapy apparatus (A); (2), a high voltage output terminal of the electric field therapy apparatus main body (1); (3), a high voltage-proof code; (4a), an electrode to which a high voltage is applied from the electric field therapy apparatus main body (1); and (4b), electrically-insulative elements for the electrode (4a), (4a) and (4b) constituting an electrically-conductive element (4). Reference numeral (5a) denotes electrically-insulative elements for insulating a chair (5) from the floor; (6), a human body; and (7), a surrounding construction including wall, floor and the like, which is equal in electric potential to the ground. For using such conventional electric field therapy apparatus (A), a part (for example, feet) of the human body (6), who sits on a chair (5) electrically insulated from the floor (ground) through the electrically-insulative elements (5a), is contacted with the electrically-conductive element (4), as shown in Fig. 1, whose surface edges are covered with the electrically-insulative elements (4b), to generate a high electric field between the

electrically-conductive element (4) and the surrounding construction (7), so that the high electric field is applied to the human body (6) for treatment.

However, the conventional electric field therapy apparatus (A) of the type mentioned above has the following inconveniences. Since the effect of the intensity of electric field received by the human body greatly varies depending on the distance between the electrically-conductive element (4) to which the high electric potential is applied and the surrounding construction (7) which is equal in electric potential to the ground, the effect of treatment to the human body (6) is affected by the location of the electric field therapy apparatus (A). In addition, when the surrounding substance, such as the electric field therapy apparatus main body (1) and the surrounding construction (7), which is equal in electric potential to the ground, contacts the human body (6), a large electric shock is given to the human body (6). If it is designed, in order to prevent this, such that, as shown in Fig. 2, an electrically-conductive element (4') is installed in the vicinity of the head and the human body (6) is contacted for treatment with a ground electrode (8) earthed to an earth (E) which is connected to the ground, the human body (6) becomes the ground voltage and therefore, no electric shock is given to the human body (6) when the surrounding substance, which is equal in electric potential to

the ground, contacts the human body (6). However, the normal feel to the supply of electric current, which would otherwise be felt by the human body (6) when an electric current is supplied to the human body (6) during an electric field treatment, is also lost, there cannot be obtained for the human body (6) an actual feel for receiving the treatment.

#### SUMMARY OF THE INVENTION

This invention relates to an electric field therapy apparatus in which a human body is treated by utilizing a high voltage, and more particularly to an electric field therapy apparatus in which the effect of treatment can be effectively maintained, which is safe and in which the human body can maintain a normal feel to the treatment given to him. In an electric field therapy apparatus according to the present invention, at least three output terminals are provided on a secondary coil of wire of a set-up transformer, electrically-conductive elements connected to the output terminals being arranged such that one of the electrically conductive elements is located in the vicinity of a head portion of a human body, another one is located at a foot portion and the remaining one is located at an intermediate portion between the first and second electrically-conductive elements which are located in the vicinity of the head portion and at the foot portion, respectively, so that an electric potential for creating difference in electric potential among the electrically-

conductive elements is supplied.

A feature of the present invention is the provision of an electric field therapy apparatus which is capable of carrying out the treatment without being affected by difference, if any, in distance between an electrically-conductive element of the electric field therapy apparatus and a surrounding construction which is equal in electric potential to the ground.

Another feature of the present invention is the provision of an electric field therapy apparatus, in which the electric potential in the human body is not raised by a high electric potential electrically conductive element and an electrically-conductive element, which is equal in electric potential to the ground, is contacted to the human body. Hence an electric shock is not great, and thus safe, even when the human body contacts a surrounding construction.

A further feature of the present invention is the provision of an electric field therapy apparatus, in which there can be obtained for the human body a normal feel of treatment without losing the feel of being supplied with electric current, by a high electric potential electrically-conductive element and an electrically-conductive element, which is equal in electric potential to the ground, being contacted to the human body.

These objects can be achieved by the constitution, as well as its circuit, of an electric field therapy apparatus constituting the present invention. One specific embodiment



of the invention is exemplified in the accompanying drawings and the detailed description to follow. It should be understood that minor alternations and modifications of the embodiment are included in the scope of the claim which will be described later.

#### BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a perspective view showing the state of use of a conventional electric field therapy apparatus;

Fig. 2 is a perspective view showing the state of use of another conventional electric field therapy apparatus; and

Fig. 3 is a schematic view of an electric field therapy apparatus according to one embodiment of the present invention.

#### DETAILED DESCRIPTION OF THE INVENTION

Fig. 3 is an illustration showing a circuit of an electric field therapy apparatus (A') according to one embodiment of the present invention, and the state of use of the electric field therapy apparatus (A'). In Fig. 3, like reference numerals to those of Figs. 1 and 2 represent like parts. Reference numeral (9) denotes a commercially available electric power source; (10); input terminals of an electric field therapy apparatus main body (1); (11), a step-up transformer for transforming the voltage of the commercially available electric power source (9) to a high voltage; and (12), electric current limiting resistors, respectively. Here, reference numerals ( $2t_1$ ), ( $2t_2$ ) and ( $2t_3$ ) denotes high voltage output terminals of a secondary

coil of wire of the electric field therapy apparatus main body (1), respectively, and different electric potentials are supplied to these terminals, respectively. Reference numeral (4a<sub>1</sub>) denotes an electrode to which a high electric potential is applied from the electric field therapy apparatus main body (1); and (4b<sub>1</sub>), an electrically-insulative element for it. A first electrically-conductive element (4D<sub>1</sub>) is constituted by these (4a<sub>1</sub>) and (4b<sub>1</sub>). Reference numeral (4a<sub>2</sub>) denotes an electrode to which a high electric potential is applied from the electric field therapy apparatus main body (1); and (4b<sub>2</sub>), an electrically-insulative element for it. A second electrically-conductive element (4D<sub>2</sub>) is constituted by these (4a<sub>2</sub>) and (4b<sub>2</sub>). In the illustrated example, the second electrically-conductive element (4D<sub>2</sub>) is disposed at the seat portion of a chair (5). Reference numeral (4a<sub>3</sub>) denotes an electrode to which a high electric potential is applied from the electric field therapy main body (1); and (4b<sub>3</sub>), an electrically-insulative element for it. A third electrically-conductive element (4D<sub>3</sub>) is constituted by these (4a<sub>3</sub>) and (4b<sub>3</sub>). Now, by introducing one end of a high voltage generated in the secondary coil of wire of the set-up transformer (11) to the first electrically-conductive element (4D<sub>1</sub>) disposed in the vicinity of the head portion of the human body (6) through an output terminal (2t<sub>1</sub>) and the other end of a high voltage generated in the secondary coil of wire of the set-up

transformer (11) to the second electrically-conductive element (4D<sub>2</sub>) which is to be contacted to the illustrated hip portion of the human body (6), a high electric field is formed between the first and second electrodes so that an upper half of the human body (6) is treated by this high electric field.

A lower half of the human body (6) is treated by a high electric field which is formed between the third electrically-conductive element (4D<sub>3</sub>) which is connected to an intermediate point of the secondary coil of wire through the output terminal (2t<sub>3</sub>) and contacted with the backs of the feet of the human body (6) and the above-mentioned second electrically-conductive element (4D<sub>2</sub>).

According to the electric field therapy apparatus of the present invention, by arranging the respective electrically-conductive elements in the vicinity of the human body, the human body can be treated without being affected by difference, if any, in distance between the human body and an electrically-conductive substance such as a surrounding construction. In Fig. 3, by bringing one of the two electrically-conductive elements (4D<sub>2</sub>) and (4D<sub>3</sub>) contacting the human body (6) into contact with the ground, the electric potential of the human body (6) becomes lower than the voltage between the high voltage output terminal (2t<sub>1</sub>) and the high voltage output terminal (2t<sub>2</sub>) of the secondary coil of wire of the set-up transformer (11) and therefore, an electric shock to the body

is lessened even when the human body contacts the surrounding construction. In addition, the remaining electrically-conductive element ( $4D_2$ ) or ( $4D_3$ ) contacts the human body (6) but is not connected to ground, therefore the human body (6) can receive an appropriate feel of the supply of electric current.

Accordingly, there can be provided a safe therapy apparatus, in which the electric potential in the human body is not raised and an electric shock to the human body is not great even when the human body contacts a surrounding construction. Moreover, the surrounding of the electric field therapy apparatus can be kept as a safe circumstance.

Furthermore, since the distance between the respective electrically-conductive elements is decreased, a high electric field can be generated with a comparatively low electric potential.

## CLAIMS:

1. An electric field therapy apparatus comprising at least three output terminals provided on a secondary coil of wire of a transformer, electrically-conductive elements connected to said output terminals being arranged such that one of said electrically conductive elements can be located in the vicinity of the head portion of a human being, another one can be located at the foot portion and the remaining one an intermediate portion between said first and second electrically-conductive elements which are located in the vicinity of the head portion and at the foot portion, respectively, so that an electric potential for creating difference in electric potential among said electrically-conductive elements is supplied.
2. An electric field therapy apparatus according to claim 1, which includes three output terminals which are different in electric potential, electrically-conductive elements covered with an electrically insulative material being connected respectively to said output terminals, said first to third electrically-conductive elements being located such that said first electrically-conductive element contacts the head portion of the human body, said second electrically-conductive element contacts a part of a body portion of the human body and said third electrically-conductive element contacts a foot portion of the human body, selected one of said second and third

electrically-conductive elements being generally equal in electric potential to the ground, a high voltage being applied to the remaining two electrically-conductive elements.

3. An electric field therapy apparatus according to claim 1, in which said electrically-conductive element is disposed at a seat portion of a chair.

4. An electric field therapy apparatus according to any preceding claim, wherein the transformer is a step-up transformer.

5. An electric field therapy apparatus substantially as hereinbefore described with reference to and as shown in Figure 3 of the accompanying drawings.

Examiner's report to the Comptroller under Section 17  
(The Search report)

GB 9401165.7

Relevant Technical Fields

- (i) UK Cl (Ed.M) A5R (RHFE)  
(ii) Int Cl (Ed.5) A61N (1/40)

Search Examiner  
D C BRUNT

Date of completion of Search  
2 MARCH 1994

Databases (see below)

(i) UK Patent Office collections of GB, EP, WO and US patent specifications.

Documents considered relevant following a search in respect of Claims :-  
1-5

(ii)

Categories of documents

- X:** Document indicating lack of novelty or of inventive step.      **P:** Document published on or after the declared priority date but before the filing date of the present application.
- Y:** Document indicating lack of inventive step if combined with one or more other documents of the same category.      **E:** Patent document published on or after, but with priority date earlier than, the filing date of the present application.
- A:** Document indicating technological background and/or state of the art.      **&:** Member of the same patent family; corresponding document.

Category	Identity of document and relevant passages	Relevant to claim(s)
A	GB 2164563 A (HAKUJU) see Figure 3	-
A	US 4292980 (SUZUKI)	-

Databases: The UK Patent Office database comprises classified collections of GB, EP, WO and US patent specifications as outlined periodically in the Official Journal (Patents). The on-line databases considered for search are also listed periodically in the Official Journal (Patents).